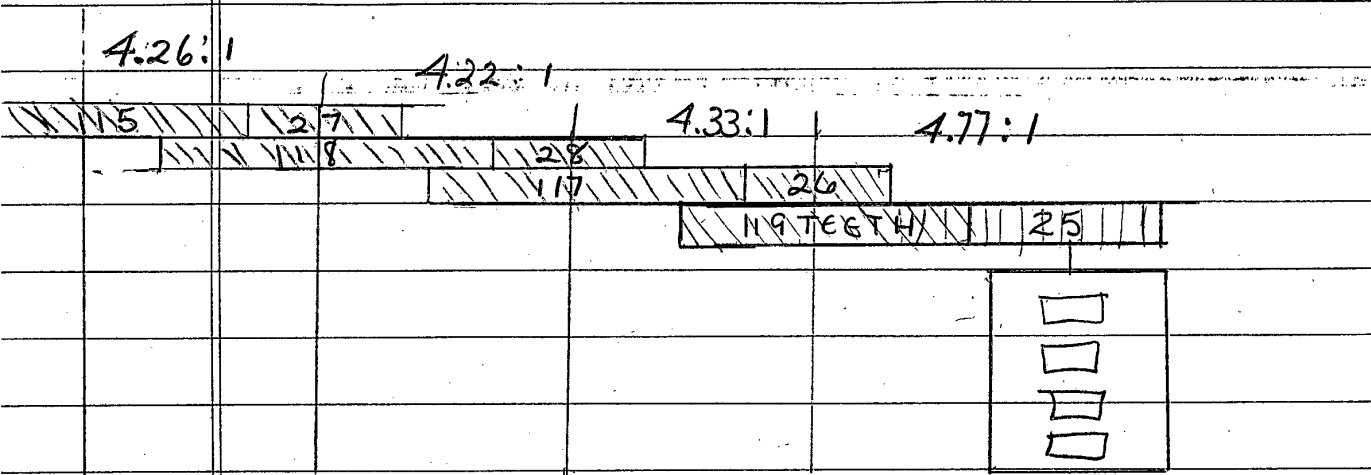
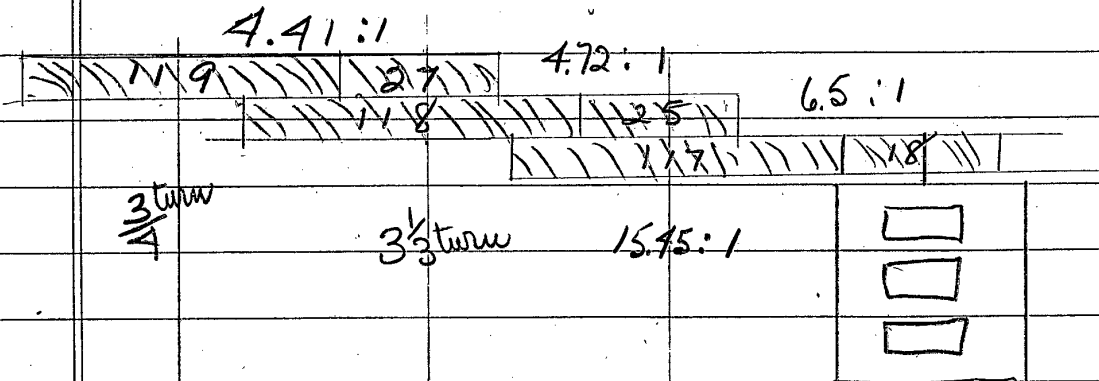


Gear train mockup for 4 place counter



RANGE = 26 TO 304
GEAR RATIO = 370:1
LAST GEAR ROTATES 270°

Gear train mockup for 3 place Counter



RANGE = 000 TO 999
GEAR RATIO = 135:1
LAST GEAR ROTATES 270°

Constructed Jan 8 + 9/56

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Audion Oscillator

(A) Components

Resistors - wire wound non inductive such as type 331 alloy under trade names such as Karma and Evershm. Temperature coefficient (.00002C).

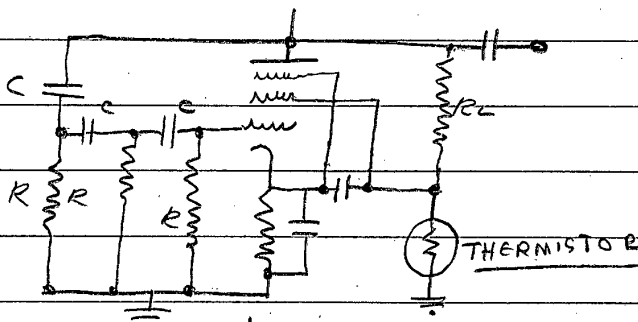
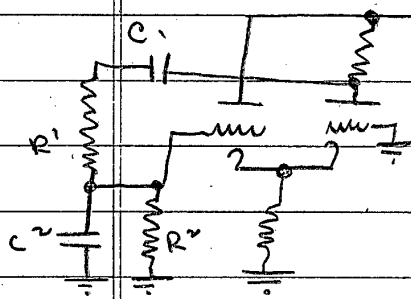
Capacitors - silver mica β temperature coefficient.

(B) Circuits

Wien Bridge

RC stabilized

Phase Shift.



$$F = \frac{1}{27 \sqrt{6} RC}$$

$$R = 1 \text{ meg } C = 20 \mu\text{MF for } 3 \text{ Kcs}$$

$$R = 1 \text{ meg } C = 1440 \mu\text{MF for } 30 \text{ cps}$$

$$C = 200 \mu\text{MF } R = 80 \text{ K } \text{ for } 3 \text{ Kcs}$$

$$C = 200 \mu\text{MF } R = 10 \text{ MEG } \text{ for } 30 \text{ cps}$$

R_L must be $\frac{1}{10} R$

$A = 29$ or more to oscillate.

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Components Parts list

Capacitors	Resistors	Potentiometers
>1130	2 - 56 K	1 - 500 K
980	1 - 150 K	C ² Taper
.5	1 - 2.4 K	
.25	1 - 3 MΩ	
.1	2 - 2 MΩ	
.01		

1 additional potentiometer to be used as gain control

1 - vee-dee-root counter to be used for frequency indicator

2 - tubes 1AG4 or 1AD4.

(not interchangeable without affecting freq.)

1 - RM 1200 battery 1.34V

2 - 502A 22½ Volt battery.

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$$297 \frac{10 \times 4}{3} = 396.1$$

Veeder - Root

- ① 4 digit veeder root counter requirements for a frequency range of 30 CPS TO 3000 CPS:

actual reduction = 396:1

a. Volume required = 4 cubic in.
 B. Gear train for 400:1 reduction involves 8 gears or 4 trains arranged in 5:1, 5:1, 4:1, 4:1 ratios

c. It is possible to use a worm and worm gear which would eliminate one set of gears but may increase the volume required for the counter and gear assembly.

- ② 4 digit veeder root counter requirements for covering a 2 band frequency range of 30 CPS TO 300 CPS; 300 CPS. TO 3000 CPS.

a. Volume required = 3 cubic in

B. gear train for 40:1 reduction would involve 3 trains arranged in 5:1, 4:1, 2:1 ratios.

c. Additional volume would be required for a band switch (micro switch) and capacitors.

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- (3) The space required for the counter and gear assembly is determined by the common stock gears available in manufacturers catalogs

Example: pinion spur gear 32 teeth 96 pitch $\frac{1}{8}$ " face $\frac{1}{8}$ " bore O.D. = 3.54"
 Large spur gear 160 teeth 96 pitch $\frac{1}{8}$ " face $\frac{3}{8}$ " bore O.D. = 1.687"

These gears provide a 5:1 reduction.

100 x 4 = 400



(4) 3 digit reeder-root counter requirements for a frequency coverage of 30 TO 3000 C.P.S.

a. a pointer on the potentiometer to be used to indicate the 1st digit, so that as the potentiometer passes through 90° of its resistance range the counter goes through its entire range 000 to 999. This method would provide frequency measurements to within the required tolerances.

B. the gear train required to obtain the reduction 400:1 would be accomplished in steps of 5:1, 5:1, 4:1, 4:1.

C. Volume required would approximate 4 cu. in

D. due to positioning of gears it would appear difficult to have the counter window and the potentiometer dial in the same plane.

E.

5. This information was obtained thru catalogs; talks with the machine shop.

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10-27-55

Memo Project 2510 file:

Per [redacted] STAT

Memo in mail which submits results of initial evaluation. Should be in our hands today or tomorrow.

memo concerning running left is also coming.

(Converter is not [redacted] project.) STAT

Note: The audio oscillator was sent out for ~~evaluation~~ demonstration on short notice. Operating instructions and general characteristics accompanied the unit but a formal memo to Branch Chief concerning the transfer did not. After the demonstration it was decided to send the unit directly into evaluation tests with a memo to follow after completion of "Spit" tests. Since the evaluation is now complete,

[redacted] indicates that the memo should wait the completion of requirements indicated by the initial evaluation ~~and~~ at which time it will ~~complete~~ cover the complete operation to date. [redacted] STAT

41.5 *open terminals*
38.5 Calibration CHART

DIAL	FREQ.(CPS)		DIAL	FREQ.(CPS)	
0	- 30	x	52	- 1010	x
2	30.2		54	- 1175	x
4	30.4	50.0	56	- 1270	x
6	30.6		58	- 1390	x
8	31.0	x	60	- 1575	x
10	- 31.5		62	- 1875	x
12	- 31.75		64	- 2075	x
14	- 32.25	x	66	- 2240	x
16	- 32.5		68	- 2400	x
18	- 33.5	x	70	- 2495	x
20	- 34.5	x	72	- 2510	x
22	- 35.25		74	- 2575	x
24	- 37	x	76	- 2600	x
26	- 40	x	78	- 2650	x
28	- 43	x	80	- 2690	x
30	- 46.5	x	82	- 2700	x
32	- 52.5	x	84	- 2775	x
34	- 59.5	x	86	- 2800	x
36	- 72	x	88	- 2875	x
38	- 93.9	x	90	- 2900	x
40	- 135	x	92	- 2950	x
42	- 310	x	94		
44	- 510	x	96		
46	- 615	x	98		
48	- 722	x	100	- 3000	x
50	- 885	x			

-6-
20

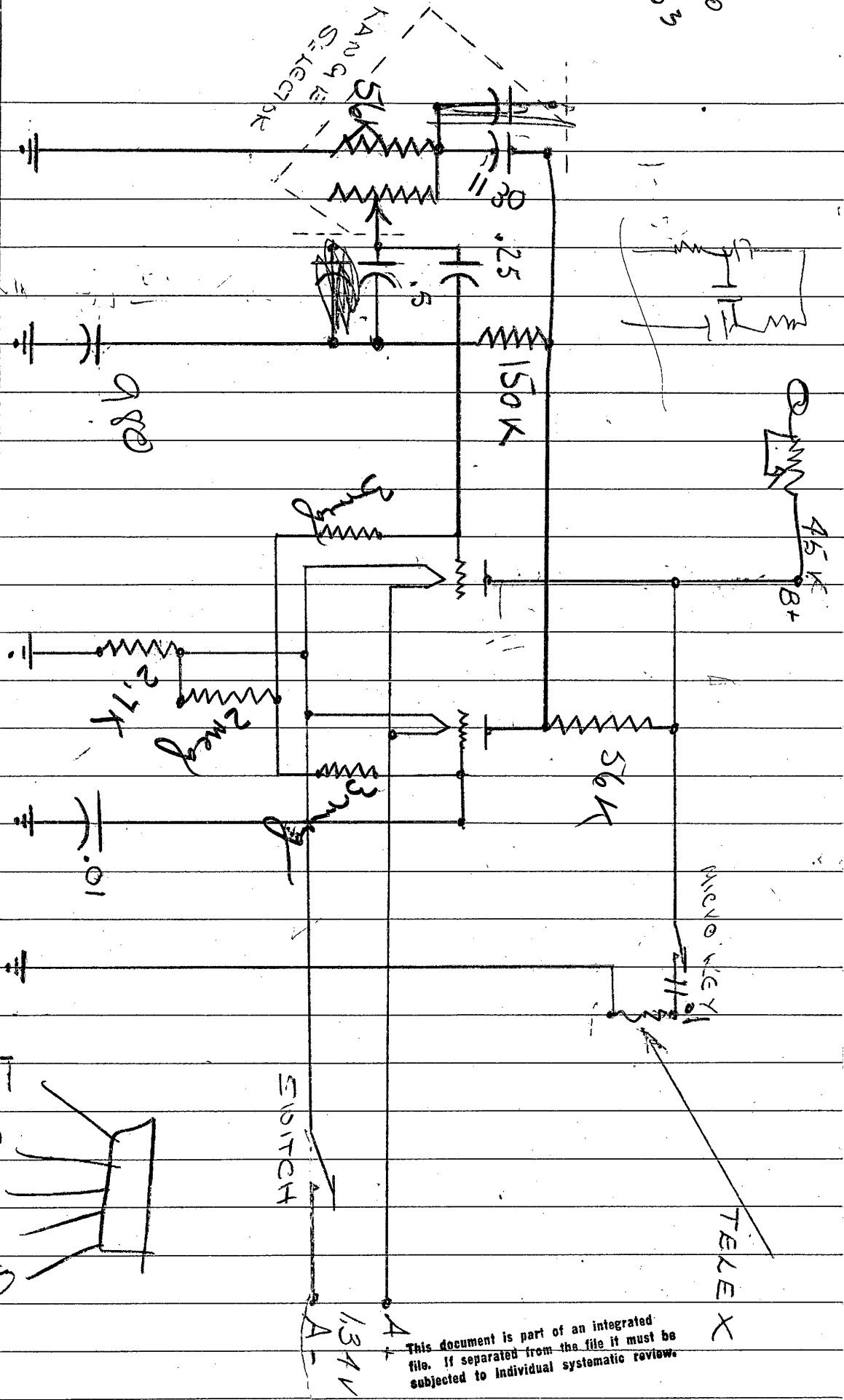
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Calibration

0	29	52	1240
2		4	1340
4	↑	6	1440
6		8	1540
8	↓	60	1725
10	30	2	1940
12	31.2	4	2140
14	32.4	6	2300
16	33.5	8	2430
18	35	70	2500
20	37.5	2	2550
22	40	4	2590
24	45	6	2620
26	50	8	2680
28	60	80	2710
30	70	2	2750
31	80	4	2800
32	90	6	2890
33	100	8	2940
33.5	120	90	3000
34.1	150	2	3060
34.5	180	4	3090
36.5	290	6	3090
38	415	8	3090
40	514	100	3090
42	755		
44	900		
46	995		
48	1070		
50	1150		

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TEMPERATURE QUINCE OSCILLATOR.



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